

BIOL112 : Microbiology

General Information

Author:	<ul style="list-style-type: none">Karoline Rostamiani
Course Code (CB01) :	BIOL112
Course Title (CB02) :	Microbiology
Department:	BIOL
Proposal Start:	Spring 2024
TOP Code (CB03) :	(0403.00) Microbiology
CIP Code:	(26.0502) Microbiology, General.
SAM Code (CB09) :	Non-Occupational
Distance Education Approved:	Yes
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000579620
Curriculum Committee Approval Date:	11/08/2023
Board of Trustees Approval Date:	12/19/2023
Last Cyclical Review Date:	11/08/2023
Course Description and Course Note:	BIOL 112 is a study of microorganisms (algae, bacteria, fungi, protozoa, and viruses). The course includes microbial biochemistry, genetics, cellular activities, applied uses, and the pathogenicity of these microorganisms. In the laboratory, students utilize various staining procedures and biochemical tests to identify at least one unknown microorganism.
Justification:	Mandatory Revision
Academic Career:	<ul style="list-style-type: none">Credit
Author:	<ul style="list-style-type: none">Karoline Rostamiani

Academic Senate Discipline

Primary Discipline:	<ul style="list-style-type: none">Biological Sciences
Alternate Discipline:	No value
Alternate Discipline:	No value

Course Development

Basic Skill Status (CB08)	Course Special Class Status (CB13)	Grading Basis
Course is not a basic skills course.	Course is not a special class.	<ul style="list-style-type: none">Grade with Pass / No-Pass Option

Allow Students to Gain Credit by Exam/Challenge

Pre-Collegiate Level (CB21)

Course Support Course Status (CB26)

Not applicable.

Course is not a support course

Transferability & Gen. Ed. Options

General Education Status (CB25)

Not Applicable

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

IGETC Area	Area	Status	Approval Date	Comparable Course
5B-Biological Science	Biological Science	Approved	09/09/1991	No Comparable Course defined.
5C-Science Laboratory	Science Laboratory	Approved	09/09/1991	

CSU GE-Breadth Area	Area	Status	Approval Date	Comparable Course
B2-Life Science	Life Science	Approved	No value	No Comparable Course defined.
B3-Laboratory Activity	Laboratory Activity	Approved	No value	

Units and Hours

Summary

Minimum Credit Units (CB07)	5
Maximum Credit Units (CB06)	5
Total Course In-Class (Contact) Hours	162
Total Course Out-of-Class Hours	108
Total Student Learning Hours	270

Credit / Non-Credit Options

Course Type (CB04)

Credit - Degree Applicable

Noncredit Course Category (CB22)

Credit Course.

Noncredit Special Characteristics

No Value

Course Classification Code (CB11)

Credit Course.

Funding Agency Category (CB23)

Not Applicable.

Cooperative Work Experience
 Education Status (CB10)

Variable Credit Course

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	3	6
Laboratory Hours	6	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	0
Course In-Class (Contact) Hours	
Lecture	54
Laboratory	108
Studio	0
Total	162

Course Out-of-Class Hours

Lecture	108
Laboratory	0
Studio	0
Total	108

Time Commitment Notes for Students

No value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Prerequisite

CHEM110 - Elements Of General Chemistry

Objectives

- Use dimensional analysis to solve quantitative problems and check answers to make sure they are physically reasonable as applied to areas such as unit conversions, stoichiometry, and gas laws for example.
- Perform laboratory experiments correctly using appropriate techniques and safety procedures.
- Describe, model, and analyze microscopic behavior to explain macroscopic properties as applied to such areas as chemical bonding, gas laws, atomic theory, acids, bases, nuclear chemistry, and oxidation-reduction.

OR

Prerequisite

CHEM120 - Fundamentals Of College Chemistry (Inorganic)

Objectives

- Evaluate scientific statements and develop an opinion as to their validity.

AND

Prerequisite

BIOL101 - General Biology I

Objectives

- Identify the properties of lipids, carbohydrates, proteins, and nucleic acids.
- Describe the structure of prokaryotic and eukaryotic cells.
- Explain cell respiration and photosynthesis.
- Describe the processes of DNA replication, transcription, and translation.
- Explain the basic mechanisms of gene regulation in prokaryotes and eukaryotes.
- Demonstrate proper use of laboratory equipment including the microscope, spectrophotometer, and micropipettes.
- Demonstrate proficiency with data collection, analysis, and graphical representation.

OR

Prerequisite

BIOL120 - Human Anatomy

Objectives

- Identify the basic features of cells and their organization as tissues.
 - Demonstrate proper use of a microscope to identify major tissue types in histological slides.
 - Identify all of the major structures of organ systems using models and tissue slides.
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OR

Prerequisite

BIOL122 - Introduction To Biology

Objectives

- Describe the structure of atoms, the properties of water and structure and function of biological macromolecules; describe the flow of information from DNA to protein.
 - Describe the flow of information from DNA to protein.
 - Identify the defining characteristics of major groups of organisms.
 - Compare prokaryotic and eukaryotic cells, and describe the structure and function of eukaryotic organelles.
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Entry Standards

Entry Standards

Analyze experimental data.

Predict chemical properties.

Demonstrate proper use of laboratory equipment and chemicals.

Use the dimensional analysis method of problem solving.

Know and understand basic chemical data, rules, and laws.

Describe important biological molecules as well as cellular structure and function.

Describe the flow of information from DNA to protein, and the principles of inheritance.

Specifications

Methods of Instruction

Methods of Instruction Lecture

Methods of Instruction Laboratory

Methods of Instruction Multimedia

Methods of Instruction Demonstrations

Out of Class Assignments

- Laboratory protocols (e. g. a written protocol that includes the title, purpose, materials needed, procedures, and expected results for each laboratory exercise)
- Unknown organism report (e.g. a written report of the data acquired from performing various tests on an organism and the identification of the organism)

Methods of Evaluation

Rationale

Exam/Quiz/Test

Written exams

Exam/Quiz/Test

Laboratory practicum exams

Report

Unknown organism report

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Gerard J. Tortora	Microbiology: An Introduction	Pearson	2023	9780137941612
John W. Foster, Zarrintaj Aliabadi, Joan L. Slonczewski (Microbiology: The Human Experience Second Edition	W. W. Norton & Company	July 2021	0393533247

Other Instructional Materials (i.e. OER, handouts)

No Value

Materials Fee

Lab fee.

Learning Outcomes and Objectives

Course Objectives

Explain a general understanding of the taxonomy and major characteristics of the various microorganisms.

Illustrate general knowledge of the physical and chemical structure of prokaryotes and eukaryotes.

Describe the biochemical processes of the cell, including cell respiration, DNA replication, genetic recombination, transcription, translation, and cellular transport.

Examine the physical and chemical methods and mechanisms used to control microbial growth.

Explain and discuss the disease process of various microorganisms.

Perform proper aseptic techniques and illustrate proficiency in performing various staining procedures and biochemical tests on microorganisms.

SLOs

Explain the biochemical processes of cellular activities and/or explain the disease process as it relates to microbial infections.

Expected Outcome Performance: 70.0

<i>ILOs</i> Core ILOs	Communicate clearly, ethically, and creatively; listen actively and engage respectfully with others; consider situational, cultural, and personal contexts within or across multiple modes of communication.
<i>NS</i> Registered Nursing - A.S. Degree Major	Complete the nursing program with requisite knowledge of the discipline including clinical evidenced-based practice within a required time frame. Demonstrate requisite knowledge of the profession of registered nursing by successfully passing the NCLEX-RN Board Exam.
<i>BIOL</i> Core PLOs	Prepare for a career in Biology by completing the AS degree in Biological Science (or AS-T in Biology) and/or being accepted for transfer to a 4-year university program in biology or a related field.
<i>ILOs</i> General Education	apply reasoning to evaluate hypotheses and theories examine causality or associations between or among variables of the natural world

Apply various staining methods and/or biochemical tests to identify microorganisms.

Expected Outcome Performance: 70.0

<i>ILOs</i> Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.
<i>NS</i> Registered Nursing - A.S. Degree Major	Complete the nursing program with requisite knowledge of the discipline including clinical evidenced-based practice within a required time frame.

NS Registered Nursing - Certificate	Demonstrate requisite knowledge of the profession of registered nursing by successfully passing the NCLEX-RN Board Exam.
	Demonstrate requisite knowledge of the profession of registered nursing by successfully passing the NCLEX-RN Board Exam.
BIOL Core PLOs	Prepare for a career in Biology by completing the AS degree in Biological Science (or AS-T in Biology) and/or being accepted for transfer to a 4-year university program in biology or a related field.
ILOs General Education	apply reasoning to evaluate hypotheses and theories
	examine causality or associations between or among variables of the natural world

Additional SLO Information

Does this proposal include revisions that might improve student attainment of course learning outcomes?

No

Is this proposal submitted in response to learning outcomes assessment data?

No

If yes was selected in either of the above questions for learning outcomes, explain and attach evidence of discussions about learning outcomes.

No Value

SLO Evidence

No Value

Course Content

Lecture Content

Introduction and History of Microbiology (1.5 hours)

- The golden age of microbiology
- 20th and 21st century microbiology
- Diversity of microorganisms
- Beneficial applications of microbiology
- Use of microorganisms in ancient civilizations

Important Biological Molecules (1.5 hours)

- Inorganic compounds
- Organic compounds

Microscopic Techniques (5.5 hours)

- Microscope types and functions
- Staining methods

Comparison of Prokaryotic and Eukaryotic Cells (3 hours)

- Structures of prokaryotic cell
- Structures of eukaryotic cell

Microbial Metabolism (6 hours)

- Enzymes
- Biochemical pathways of energy production
- Fermentation end products
- Photosynthesis

Microbial Growth (3 hours)

- Requirements for growth 6 laboratory hrs
- Culture media

- Phases of growth
- Direct and indirect measurements of growth

Control of Microbial Growth (6 hours)

- Physical methods of microbial control
- Chemical methods of microbial control
- Actions of microbial control agents

Microbial Genetics (6 hours)

- DNA replication
- Transcription and translation
- Regulation of gene expression
- Gene mutations
- Transformation
- Transduction
- Conjugation
- Genetic recombination

Recombinant DNA and Biotechnology (2 hours)

- Restriction enzymes
- Vectors and sources of DNA
- Applications of genetic engineering
- Genetically engineered products for medical therapy

Microbial Classification and Identification (1.5 hours)

- Criteria for classifying and identifying microorganisms
- Bergey's manual
- Identification of unknown microorganisms

Bacteria (3 hours)

- Classification of bacterial groups
- Pathogenic bacteria and the diseases they cause

Fungal Diseases (1 hour)

Protozoa (1 hour)

Viruses (3 hours)

- Classification
- Viral structure
- Isolation, cultivation, and identification of virus
- Viral multiplication
- Viruses and cancer
- Latent and slow viral infections

Prions (.5 hour)

Epidemiology and Principles of Disease (9 hours)

- Normal microbiota
- Etiology of infectious diseases
- Classifying infectious diseases
- Transmission of diseases
- Nosocomial infections

Mechanisms of Pathogenicity (2 hours)

- Portals of entry
- Pathogens penetrate host defenses
- Pathogens damage host cells

Antimicrobial Drugs (1.5 hours)

- Action of antimicrobial drugs
- Survey of commonly used antimicrobial drugs
- Antimicrobial sensitivity

Total hours: 54

Laboratory/Studio Content

Microscopic Techniques (34.5 hours)

- Microscope types and functions
- Staining methods

Comparison of Prokaryotic and Eukaryotic Cells (6 hours)

- Structures of prokaryotic cell
- Structures of eukaryotic cell

Microbial Metabolism (12 hours)

- Enzymes
- Biochemical pathways of energy production
- Fermentation end products
- Photosynthesis

Microbial Growth (6 hours)

- Requirements for growth
- Culture media
- Phases of growth
- Direct and indirect measurements of growth

Control of Microbial Growth (9 hours)

- Physical methods of microbial control
- Chemical methods of microbial control
- Actions of microbial control agents

Microbial Genetics (6 hours)

- DNA replication
- Transcription and translation
- Regulation of gene expression
- Gene mutations
- Transformation
- Transduction
- Conjugation
- Genetic recombination

Microbial Classification and Identification (7.5 hours)

- Criteria for classifying and identifying microorganisms
- Bergey's manual
- Identification of unknown microorganisms

Bacteria (6 hours)

- Classification of bacterial groups
- Pathogenic bacteria and the diseases they cause

Protozoa (3 hour)**Antimicrobial Drugs (18 hours)**

- Action of antimicrobial drugs
- Survey of commonly used antimicrobial drugs
- Antimicrobial sensitivity

Total hours: 108